

# BACTERIAL DISEASES OF SKIN

- Cutaneous bacterial infections are typically pyogenic and are thus commonly called **pyodermas**.
- They can be categorized as *primary and secondary* or *superficial and deep*.
- Bacterial skin disease is seen much more frequently in **dogs** than in any other mammalian species, and pyoderma is one of the most common skin diseases in dogs.

# BACTERIAL DISEASES OF SKIN

- **Staphylococci** are the most common bacteria isolated agents from pyoderma.
  - »»» **Staphylococcus intermedius**: in dog and horse,
  - »»» **Staphylococcus aureus**: in horse, cattle and sheep
  - »»» **Staphylococcus hyicus**: in piglet, horse ve cattle
  - Dermatophilus congelensis: is responsible for superficial pyoderma in many species.

# Superficial Bacterial Pyoderma

- ❄️ Superficial pyodermas involve the epidermis and/or superficial portion of hair follicles.
- They occur more commonly than deep pyodermas.
- Superficial pyodermas usually are of short duration, heal without scarring, and are not usually associated with systemic illness.
- *Gross lesions are extremely variable* and include papules, pustules, crusts, circular scaling areas of alopecia (**epidermal collarettes**), hyperpigmented or erythematous macules, a moth-eaten appearance to the hair coat, diffuse erythroderma, and hyperpigmented lichenified plaques.

# Superficial Bacterial Pyoderma

- *Microscopic lesions* consist of subcorneal or loosely organized, spongiotic superficial epidermal pustules, superficial folliculitis, and crusts. **Neutrophils** are the predominant inflammatory cell.
- Bacteria are not always visible histologically and culture may be necessary to confirm the etiology.

# Superficial Bacterial Pyoderma

❄ Impetigo (Superficial pustular dermatitis)

❄ Exudative epidermitis of pigs

❄ Dermatophilosis

❄ Ovine Fleece Rot

# Impetigo

- *Impetigo is a superficial pustular dermatitis that **does not involve hair follicles**.*
- It is most common in **dogs** but also occurs in **kittens, piglets, cows, sheep, and goats**. Impetigo is usually caused by **coagulase-positive staphylococci** in association with *predisposing causes*.
- Moist and dirty environments, cutaneous abrasions, parasitism, stress, and poor nutrition are common predisposing factors in most species.
- Impetigo in adult dogs is frequently seen in conjunction with **diabetes mellitus, hypothyroidism, and natural or iatrogenic hyperglucocorticism**.

# Impetigo

- The lesions are most common on the glabrous skin of the inguinal and axillary areas.
- The lesions begin as small erythematous papules that develop into superficial pustules. They are fragile and rupture easily, leaving a honey-colored crust adherent to a shallow erosion.
- *A bullous form of impetigo, consisting of large flaccid pustules, is more common in adult dogs.*
- *The microscopic lesion of impetigo is a subcorneal pustule composed of neutrophils primarily. The pustules usually extend above the skin surface and are located between hair follicles.*

# Dermatophilosis

- Dermatophilosis (cutaneous streptothricosis, mycotic dermatitis, cutaneous actinomycosis, rain rot) is an *acute, subacute, or chronic suppurative exudative dermatitis* caused by the *actinomycete Dermatophilus congolensis*.
- The disease is occasional in **cattle, sheep, goat, horse** and it is rare in **dog, cat, pig, and human**.
- The disease occurs worldwide and has a wide host range but it is *most common in the hot humid tropics and subtropics and in areas with heavy prolonged rains*.
- In cattle and sheep, dermatophilosis causes important economic losses.



# Ovine Fleece Rot (Water-Rot / Weather Stain)

- **Ovine fleece rot** is a superficial bacterial dermatitis usually caused by excessive moisture (usually in the form of rain) that penetrates the fleece (wool), wets the skin, and causes proliferation of *Pseudomonas* spp. (*Pseudomonas aeruginosa*).
- Approximately 1 week of continual wetting is usually sufficient to cause marked proliferation of the bacteria on the skin and in the fleece.
- This is followed by **an acute inflammatory** response with **serum exudation and matting of the fleece.**

# Ovine Fleece Rot (Water-Rot / Weather Stain)

- The fleece is also discolored because of production of pigments (chromogens) by the *Pseudomonas* bacteria and has a rotten odor. The condition may be complicated by other concurrent microbial infections such as dermatophilosis.
- The fleece can be painted green with 'pyocyanin' pigment produced by *P. aeruginosa*.
- In the presence of spore-forming bacilli, it may cause **a red pigment coloration.**

# Ovine Fleece Rot

- Microscopic lesions include suppurative **epidermal pustular dermatitis** and **superficial folliculitis**.
- Ovine fleece rot is important economically because the malodor attracts flies, predisposing to myiasis (infestation of tissue by the larvae of dipterous flies), and the value of the affected wool is reduced.

# Deep Bacterial Pyoderma

- Deep pyodermas are serious bacterial infections that involve the hair follicle, dermis, and/or subcutis.
- They are usually **chronic or recurrent**, **heal with scarring**, and are commonly associated with **regional or generalized lymphadenopathy** and **systemic signs**.
- ☀ **Lesions** include **dark red or violaceous raised nodules**, **poorly demarcated areas of tissue swelling**, **hemorrhagic bullae**, **fistulous tracts**, **abscesses**, **purulent or serosanguineous exudate that dries to form crusts**, and **necrotic or ulcerated skin covered by crusts**.
- **Microscopic changes** include **folliculitis**, **furunculosis**, **nodular to diffuse dermatitis or panniculitis**, and **variable fibrosis**.

# Deep Bacterial Pyoderma

- ☀ **Staphylococcal folliculitis and furunculosis**
- ☀ **Ulcerative Lymphangitis**
- ☀ ***Abscesses and cellulitis***

# Cutaneous Bacterial Granulomas

- A wide variety of bacteria are capable of producing granulomatous inflammation of the skin.
- The organisms are frequently of low virulence and are introduced by traumatic implantation.
- These infections are typically *slowly progressive* and produce *cutaneous or subcutaneous nodules*.
- Inflammation is nodular or diffuse, granulomatous or pyogranulomatous, and involves the dermis, panniculus, or both.

# Cutaneous Bacterial Granulomas

❖ **Actinomycosis and nocardiosis**

❖ **Mycobacterial infections**

**(f.e. Feline leprosy)**

❖ **Botryomycosis**

**(Bacterial pseudomycosis, Bacterial granuloma)**

# Feline leprosy

Leprosy usually evokes images of deformed faces and hands and leper colonies.

This disease, caused by *Mycobacterium leprae*.

It typically causes granulomas (firm fleshy, tumour-like masses) in the skin and tissues directly under the skin. These can become ulcerated and secondary bacterial infections can develop.



# Glanders (Farcy, Malleus, Droes)

- It is characterized by nodular lesion of the lungs and other organs as well as ulcerative lesions of the skin and mucous membranes of the nasal cavity and respiratory passage.
- Burkholderia mallei.
- Glanders is a zoonotic disease.
- It is a highly contagious and usually fatal disease of equidae → Horses, mules, and donkeys
- Carnivores are susceptible to disease if they consume glandered meat.

# Glanders (Farcy, Malleus, Droes)

- TRANSMISSION:

☐ Ingestion → Feeding troughs and water contamination or Nasal discharge

☐ inhalation

☐ via direct contact → Through diseased animal

- Therefore the integumentary (skin), respiratory, and alimentary systems are portals of entry for the bacterium, whereas the integumentary and respiratory systems are final destinations for the bacterium.

# Glanders (Farcy, Malleus, Dries)

- It is the intervening mechanisms involved in the potential pathways of spread that are unresolved.
- At the skin, the epidermis and dermis impose structural and functional barriers blocking access to lymphatic vessels in the dermis and subcutis.
- It appears that the skin must be penetrated and the bacterium carried by direct extension into the dermis and subcutis for pyogranulomatous lymphangitis to develop.
- Thus the bacterium enters and acts locally.

# Glanders (Farcy, Malleus, Droes)

- Gross lesions include ulcers, pustules, and nodules that can affect skin of any part of the body.
- Most frequently involves lymphatic vessels of the legs and flanks (cutaneous glanders), resulting in pyogranulomatous lymphangitis and lymphadenitis.
- Nodules typically occur along the course of lymphatic vessels, resulting in a raised beaded appearance of the skin.

# Glanders (Farcy, Malleus, Droles)

- They often rupture because of trauma to the skin or from pressure necrosis caused by an expanding volume of exudate within the nodules.
- This process results in craterlike ulcers of the skin that **discharge a thick yellowish-white viscid and sticky purulent material containing abundant bacteria.**
- *Burkholderia mallei* has most commonly via fomites arising **from purulent exudate discharged from ulcerated lymphatic vessels of the skin.**

# Glanders (Farcy, Malleus, Droles)

- Microscopically;
- ulcer
- karyorrhectic neutrophil leukocytes → scattered coal dust like appearance → characteristic findings
- macrophages
- multinucleated giant cells (Langhans)
- Lymphangiectasia
- pyogranulomatous inflammations → pyogranulomatous lymphangitis and lymphadenitis
- Ulcerative pyogranulomatous lymphangitis.
- Edema

# Bacterial Pododermatitis of Ruminants

## \* Footrot

\* Papillomatous digital dermatitis

\* *Contagious Ovine Digital Dermatitis*

\* Contagious Foot Rot, Benign Foot Rot in Cattle

\* *Contagious Foot Rot in Sheep*

\* Necrobacillosis of Cattle

\* *Necrobacillosis of Sheep*

# FUNGAL DISEASES OF SKIN

- Mycotic infections are commonly divided into three categories:

»»»➤ **Cutaneous mycoses**

»»»➤ **Subcutaneous mycoses**

»»»➤ **Systemic mycoses**



## FUNGAL DISEASES OF SKIN

# Cutaneous mycoses

- Cutaneous mycoses are infections in which the fungal organisms are generally confined to the nonliving keratinized tissues, i.e., *stratum corneum, hair, claw, and horn*.
- *These infections include*
- *candidiasis,*
- *Malassezia dermatitis,*
- *and dermatophytosis (ringworm).*

# FUNGAL DISEASES OF SKIN

## Cutaneous mycoses

### ✱ Dermatophytosis

- ✱ Dermatophytosis ("ringworm") is a superficial fungal infection generally confined to the keratin layers of the skin, hair, and nails.
- ✱ Pathogenic genera include *Epidermophyton*, *Microsporum*, and *Trichophyton*.
- ✱ Dermatophytosis occurs worldwide, is the most important cutaneous (superficial) mycosis, and is common in human beings and animals, especially cats.

# FUNGAL DISEASES OF SKIN

## Dermatophytosis

- They are commonly divided according to the host preference and natural habitat of the fungus.
- *The anthropophilic dermatophytes* are primarily adapted to humans and rarely infect other animals.
- *The zoophilic dermatophytes* are those dermatophytes that have become adapted to animals and typically cause less inflammation in their adapted hosts. They occasionally infect humans.
- *The Geophilic dermatophytes* normally inhabit the soil in association with keratinous debris in the process of decomposition but they may cause human and animal infection.

# FUNGAL DISEASES OF SKIN

## Dermatophytosis

- Transmission of dermatophytosis occurs by **direct contact with infected animals** or **indirectly by exposure to infective hair and scales in the environment** (contaminated grooming equipment, bedding, saddles, cages, etc.).
- *Hair fragments containing infectious arthrospores are the most effective means of transmission.*
- They can remain infectious for more than 18 months.
- For the formation of infection str. corneum should be damaged by **mild trauma or permanent wetness and maceration**.

# FUNGAL DISEASES OF SKIN

## Dermatophytosis

- Dermatophytes occur as septate hyphae that break up into chains of round-to-oval arthrospores in the surface and follicular keratin
- *Hyphae* are also usually present in the hair shafts and arthrospores are formed on the outside of the hairs (ectothrix) or within the hairs (endothrix).
- Microsporum infections are usually ectothrix and Trichophyton infections are both ectothrix and endothrix.

# FUNGAL DISEASES OF SKIN

## Dermatophytosis

- Microscopically;
- *Ortho- and parakeratotic hyperkeratosis*
- *acanthosis*
- Inflammation → perivascular and perifollicular lymphocytes and macrophages.
- *Neutrophilic luminal folliculitis*
- *follicular rupture*
- *development of discrete granulomas*
- *Eosinophils*
- *extensive furunculosis.*

# FUNGAL DISEASES OF SKIN

## Cutaneous mycoses

### ✧ CANDIDIASIS

- ✧ Candidiasis (candidosis, moniliasis, thrush) is a rare opportunistic infection of skin, mucocutaneous junctions, external ear canal, and the claw bed.
- Factors which alter the superficial keratin barrier (such as maceration, chronic trauma, or burns), upset normal flora (such as prolonged broad spectrum antibiotic therapy), or produce immunosuppression (such as diabetes mellitus, hyperadrenocorticism, neoplasia, viral infections, cytotoxic chemotherapy, or prolonged glucocorticoid treatment) predispose to infection with the organism.

## FUNGAL DISEASES OF SKIN

# CANDIDIASIS

- Infections have been described in *dogs, cats, pigs, horses, and goats*.
- *Lesions are variable and may begin as papules, pustules, and vesicles which evolve into characteristic sharply delineated ulcers with erythematous borders and a malodorous surface with moist gray-white exudate.*
- Chronic lesions consist of thickened alopecic hyperkeratotic skin with prominent folds.



# FUNGAL DISEASES OF SKIN

## CANDIDIASIS

- Histologic changes include hyperkeratosis, parakeratosis, serocellular crusts, subcorneal or superficial epidermal neutrophilic pustules, and spongiosis. The dermis is edematous and contains a superficial perivascular to interstitial mixed infiltrate.
- *Yeasts, pseudohyphae, and hyphae may be numerous but are best visualized with PAS or CMS stains.* Generally, yeasts are most numerous on the surface of the lesions, while hyphae and pseudohyphae extend into the epidermis.

# ARTHROPOD ECTOPARASITES

- The parasites of concern to us here belong to the two large classes.

- **INSECTA**

- ♠ Diptera (flies)
- ♠ Siphonaptera (fleas)
- ♠ Mallophaga (biting lice)
- ♠ Siphunculata (sucking lice).



## **ARACHNIDA**

- ♠ Ticks
- ♠ Mites

# ARTHROPOD ECTOPARASITES (FLIES)

✓ **Myiasis** is the infestation of the tissue of living animals with the larvae of dipterous flies.

♥ Cuterebra

♥ **Warbles (HIPODERMOSIS)**

♥ Cattiphorine myiasis (blowflies)

♥ Oestridae (nasal bots, warbles),

♥ Gasterophilidae (stomach bots of horses),

✓ **Sheep ked infestation**

✓ **Hornfly dermatitis**

✓ **Mosquito-bite dermatitis**

# ARTHROPOD ECTOPARASITES (FLIES)

## ✱ HIPODERMOSIS (WARBLES)

### » NOKRA – OKRA – BÜVELEK – İMİÇ

- *Hypoderma bovis* and *Hypoderma lineatum* in cattle, although the parasite is not host specific; horses, sheep and humans are affected occasionally.

# ARTHROPOD ECTOPARASITES (HIPODERMOSIS)

- ♣ The eggs are deposited predominantly on the hair of the legs.
- ♣ Larvae emerge 4-6 days later and burrow directly into the skin or into hair follicles causing minimal irritation.
- ♣ Larvae migrate along fascial planes leaving tracks of green gelatinous material known as "butcher's jelly."
- ♣ The first instar larvae of *H. bovis* overwinter in the epidural fat, whereas those of *H. lineatum* develop in the esophageal submucosa.

# ARTHROPOD ECTOPARASITES (HIPODERMOSIS)

- ♣ In the spring, the larvae migrate dorsally to the subcutaneous tissue of the back to **form subcutaneous nodules** "3 cm diameter with a central pore for respiration.
- ♣ The lesions, which are known as "**warbles**," last for 4-6 weeks, during which the larvae undergo 2 molts.
- ♣ The mature third-instar larvae emerge from the breathing hole and pupate in the soil.

# ARTHROPOD ECTOPARASITES (HIPODERMOSIS)

- ♥ In horses, the lesions occur in the saddle region and are often "blind" in that the larvae do not complete their development.
- ♥ Fatalities resulting from aberrant migration into the central nervous system are reported in horses.

# ARTHROPOD ECTOPARASITES (HIPODERMOSIS)

- **Histologically**, the cellular reaction is predominantly eosinophilic and lymphocytic. It is the eosinophilic infiltrate that gives "butcher's jelly" its green coloration.
- The actual "warble" is lined by a **wall of granulation tissue** that matures to form a connective tissue capsule in which lie islands of eosinophils.
- The **cystic cavity** between **the cuticle of the parasite and the granulation tissue** fills with fibrin and a few inflammatory cells, chiefly eosinophils.
- Cuticle sloughed during ecdysis, or remnants of dead larva, incite a marked foreign body giant cell reaction.



# ARTHROPOD ECTOPARASITES (HIPODERMOSIS)

- ♠ Once the larvae emerge, the cavity is repaired by fibrosis, but small foreign body granulomas may persist for months.
- Warbles are economically important.
- The buzzing of the adult *H. boris* (*H. lineatum* is silent) disturbs cattle causing considerable loss in milk and meat production.
- Larval tracks in the tissues decrease carcass value.
- Larval rupture, either accidental or deliberate, may induce a fatal anaphylactic reaction.

# ARTHROPOD ECTOPARASITES

## (Fleas)

- Fleas are ubiquitous and intermittent, obligate parasites.
- Fleas are chiefly a problem in cats, dogs, pigs, and humans.
- Fleas are also vectors of tularemia, bubonic plague, and rabbit myxomatosis.

# ARTHROPOD ECTOPARASITES

## (Fleas)

- Some animals may develop **flea bite dermatitis**, which is reaction to the many irritant substances in the flea's saliva, but the vast majority of animals that develop lesions do so because of **hypersensitivity reactions** to **allergenic components** of the flea saliva.
- Flea allergy dermatitis is an extremely common and very **important disease of the dog and cat**.
- Finally the blood-sucking activities of fleas may induce **blood-loss, iron deficiency anemia in heavily infested animals**, particularly in kittens, puppies or debilitated adults.

# ARTHROPOD ECTOPARASITES

## (Lice)

- Lice are **host specific**, obligate parasites of the class Insecta.
- Two orders of lice are recognized. (**Mallophaga**, biting lice and **Anoplura** , sucking lice)
- Infestation with lice is called **pediculosis**.
- It tends to be a **seasonal problem**, being worse in winter.
- Most lesions result from skin irritation and resultant pruritus. They include **alopecia, papules, crusts, and damage to wool or hide caused by rubbing or biting**.
- **Sucking lice** may induce **anemia**, which is occasionally fatal in heavily infested animals.
- **Weight loss and decreased milk production** are associated with the constant irritation seen in some lice infestations.

# ARTHROPOD ECTOPARASITES (Mites)

- 🕸️ Sarcoptic mange
- 🕸️ Notoedric mange
- 🕸️ Psoroptic mange
- 🕸️ Chorioptic mange
- 🕸️ Otodectic mange
- 🕸️ Cheyletiellosis
- 🕸️ Psorergatic mange
- 🕸️ Demodectic mange
- 🕸️ Trombiculiasis

# ARTHROPOD ECTOPARASITES (Ticks)

- ✘ They are divided into two families, the *Argasidae* and the *Ixodidae*.
- Ticks are most important as vectors for a large number of serious viral, bacterial and protozoal diseases of domestic animals.
- Babesiosis, Rocky Mountain spotted fever, Lyme borreliosis, heartwater disease, Q fever, louping ill, and anaplasmosis are a few examples of tick-transmitted diseases.

# HELMINTH DISEASES OF SKIN

♣ **Cutaneous habronemiasis**

♣ **Stephanofitariasis**

♣ **Onchocerciasis**

♣ *Equine cutaneous onchocerciasis*

♣ *Bovine cutaneous onchocerciasis*

♣ **Parafitariasis**

♣ **Pelodero dermatitis**

# Tumors of The Skin

## Tumors of the epidermis

- *Papilloma and fibropapilloma*
- *Squamous cell carcinoma*
  - *Basal cell tumor*

## Tumors with adnexal differentiation

### Melanocytic tumors

### Spindle cell tumors